Advanced Fuzzing with Peach 2

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Agenda

- Introduction to Peach 2
- Data mutations
- Peach State Machine
- Peach Farm
- Peach in The Middle

Introduction to Peach 2

Peach 1

- Framework for writing fuzzers
- Instrumentation via wrapper APIs
- No data definition layer (DDL), just fuzzer
- Steep learning curve
- Complex fuzzers result in complex fuzzer code

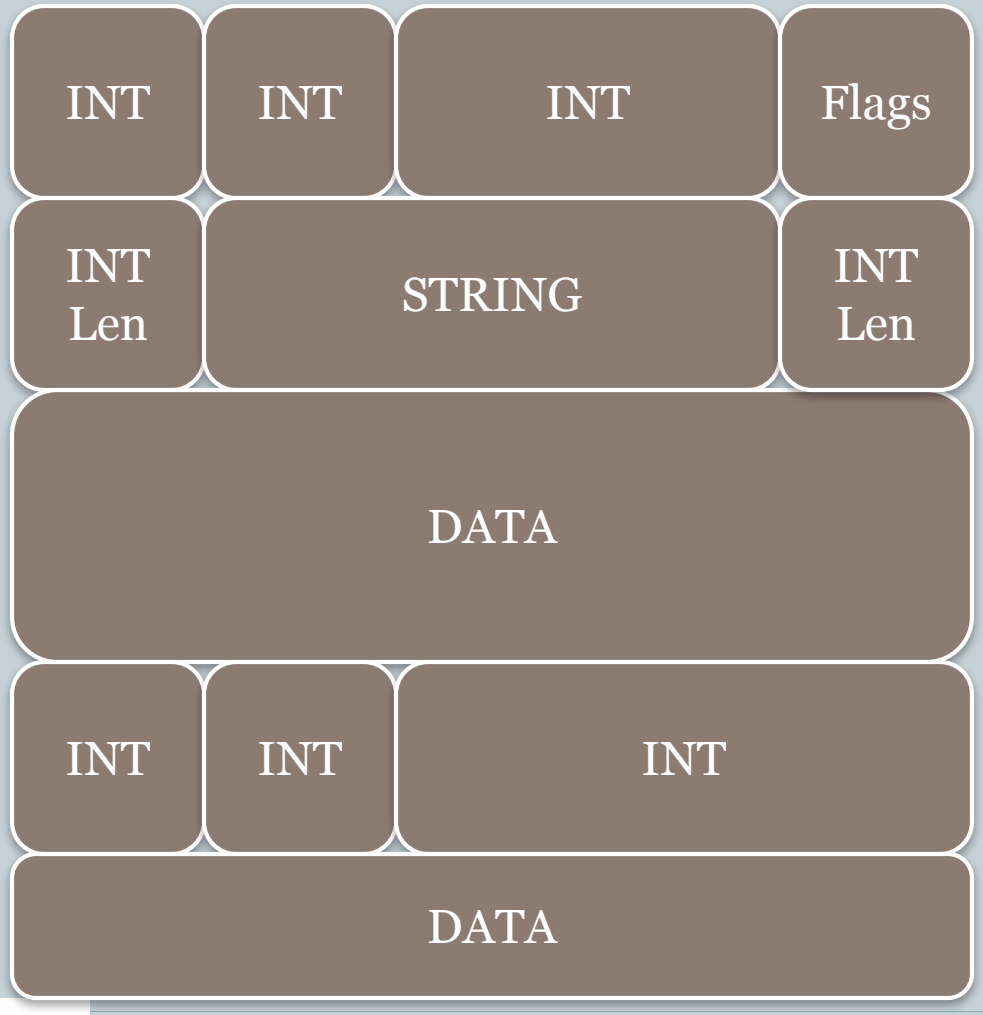
Peach 2

- Reduce creation time and simplify fuzzer generation
- Fuzzer platform, not framework
- Modeling based approach
- Fault detection
- Lower learning curve

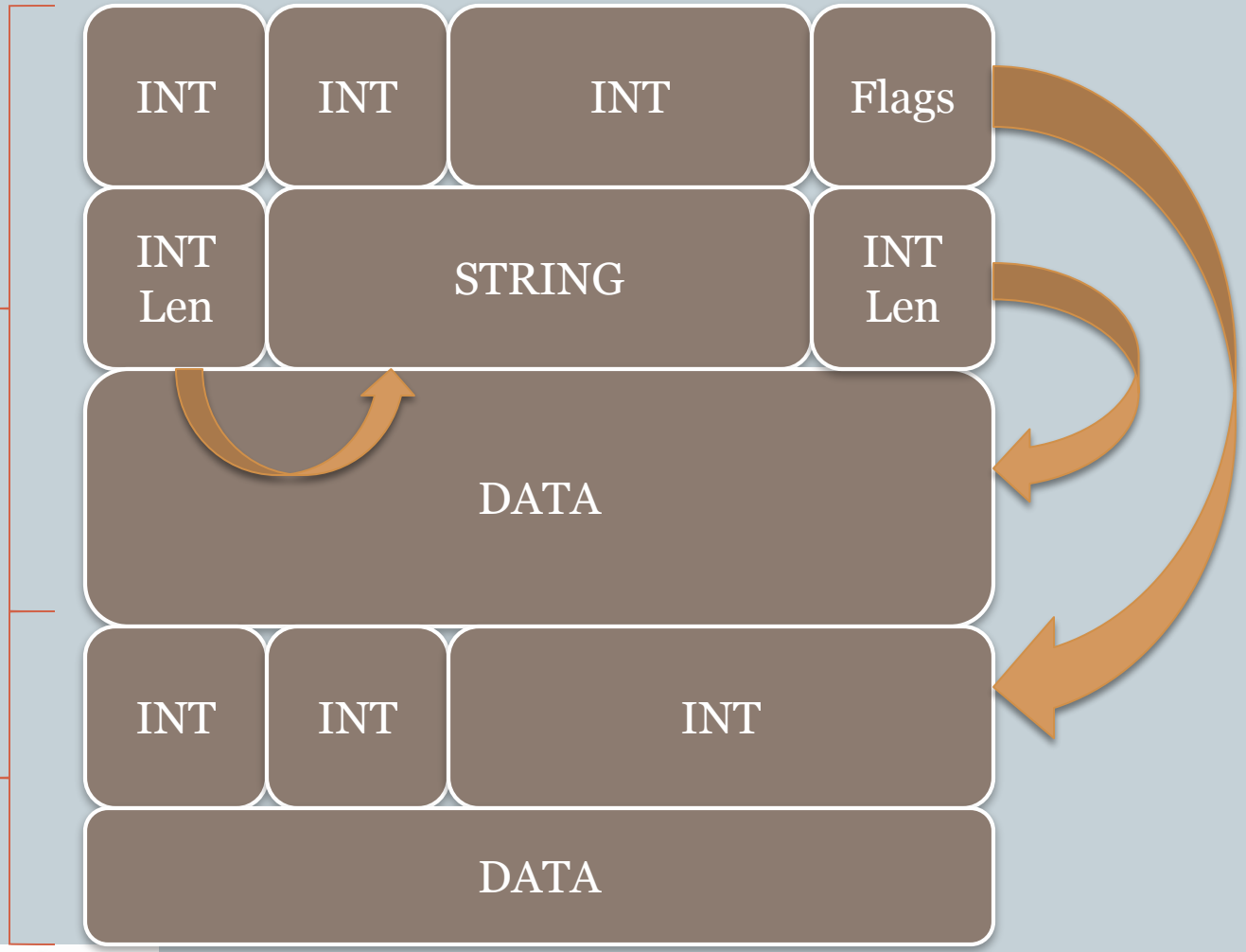
Modeling Based Fuzzing

- Model types and data
- Model state machine
- Support models with data sets
- Mutate models with mutators

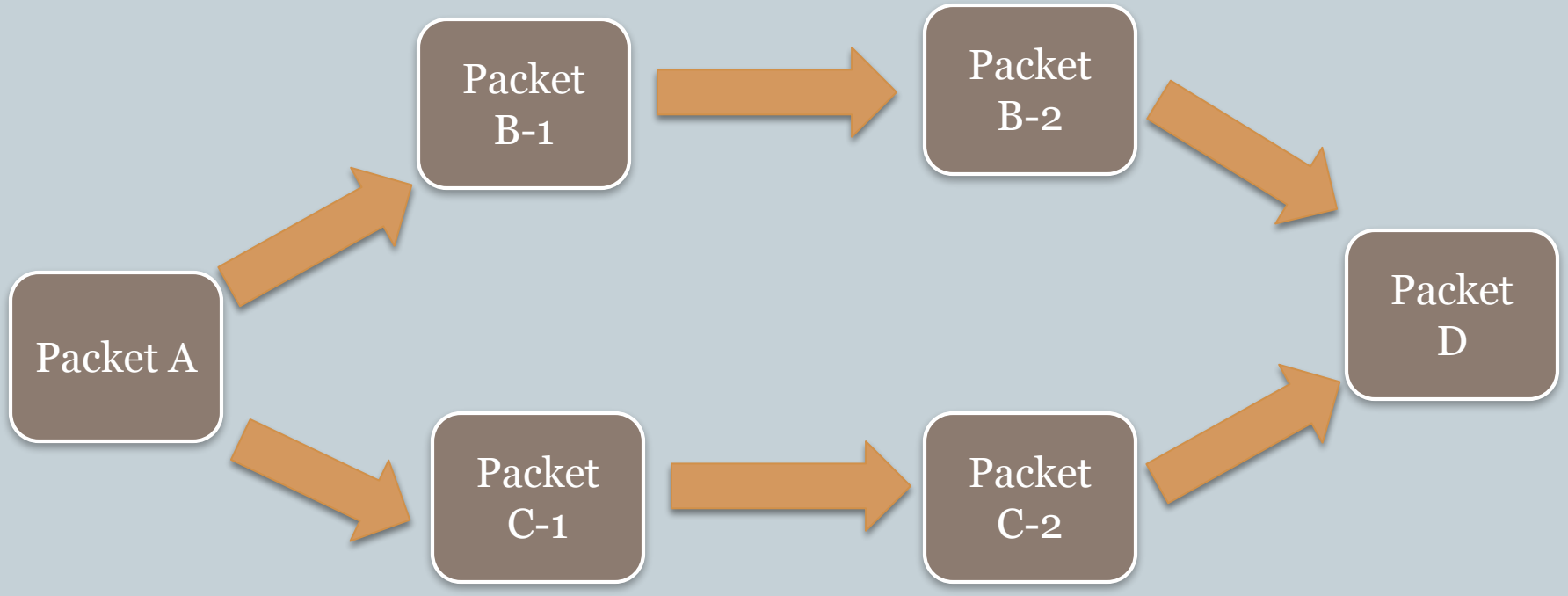
Model Data: Types



Model Data: Relationships



Model Data: State Model



Benefits of Modeling

- Easy reuse of definitions
- Complex mutations can be applied to a model
- Improvements to data generation or mutation independent of model
- Data read into definition as well as generated

Data Modeling

- Define structure of data
- Define relations in data
- Reuse definitions

- Block
- Sequence
- Choice
- String
- Number
- Flags/Flag
- Blob

- Relation
- Transformer

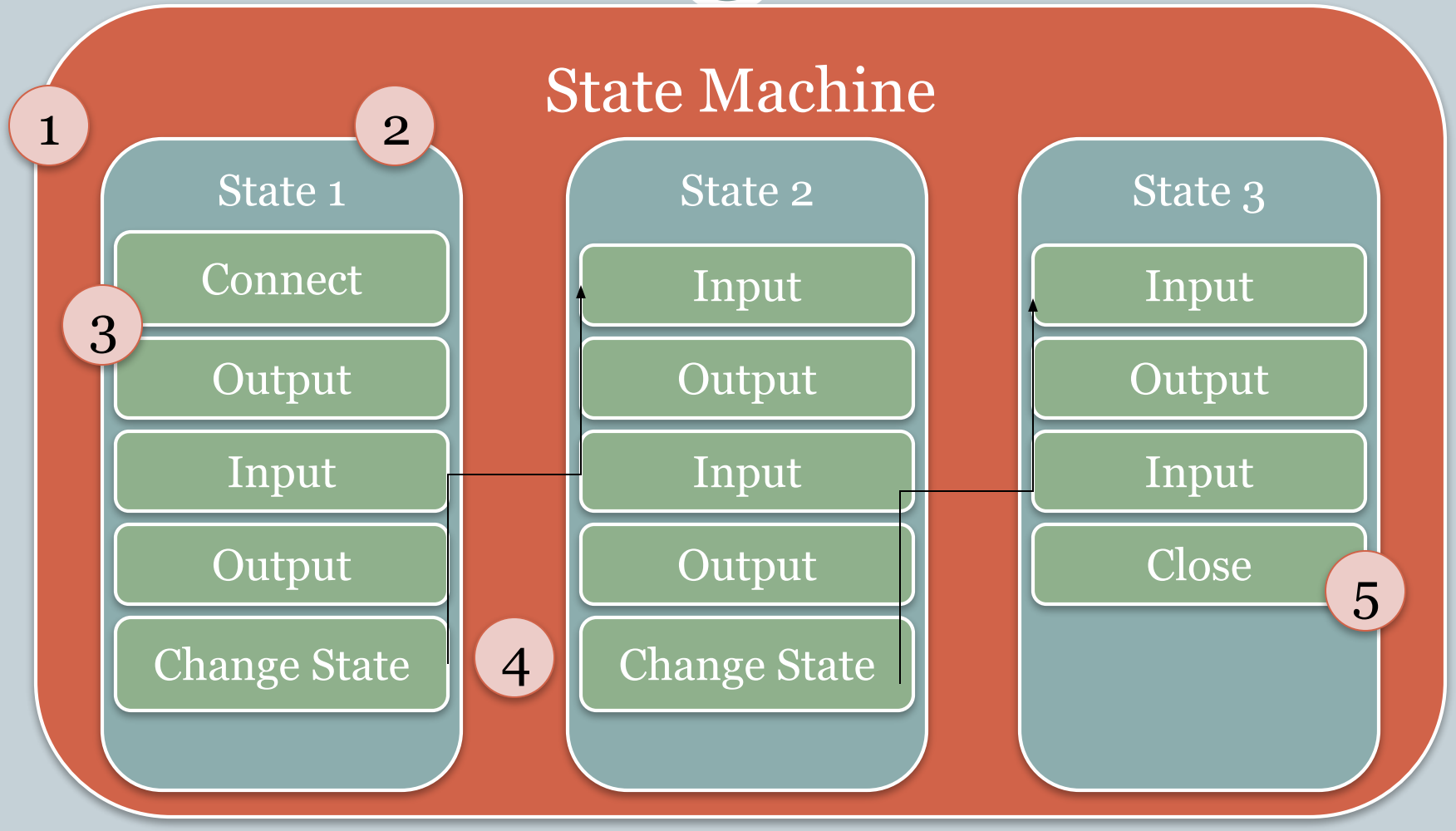
State Modeling

State Modeling

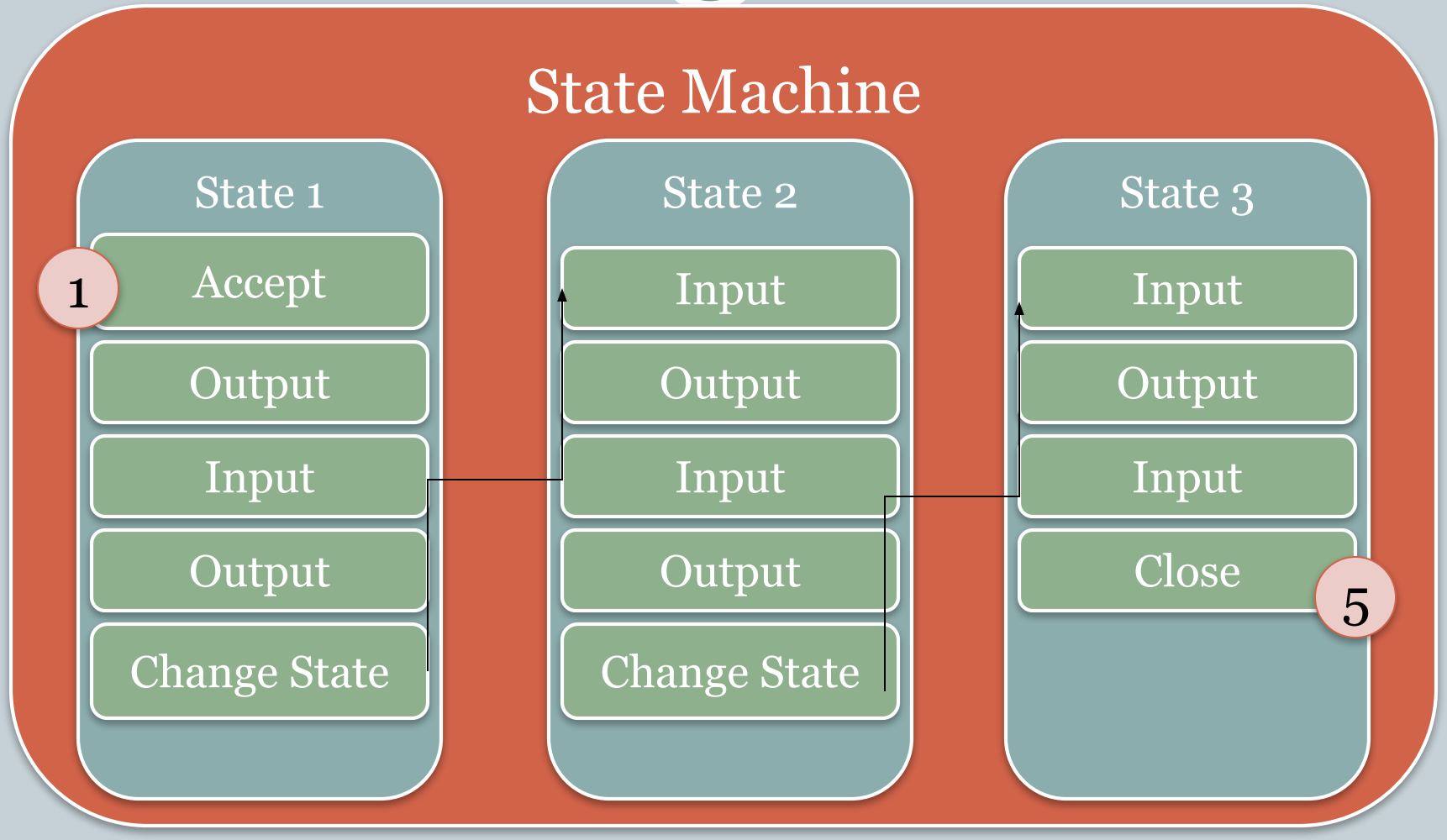
Stream	Call
• TCP, UDP, Files	• COM, RPC, SOAP

• Connect
• Accept
• Input
• Output
• Close
	• Call
	  ○ Method
	  ○ Parameters
	  ○ Result

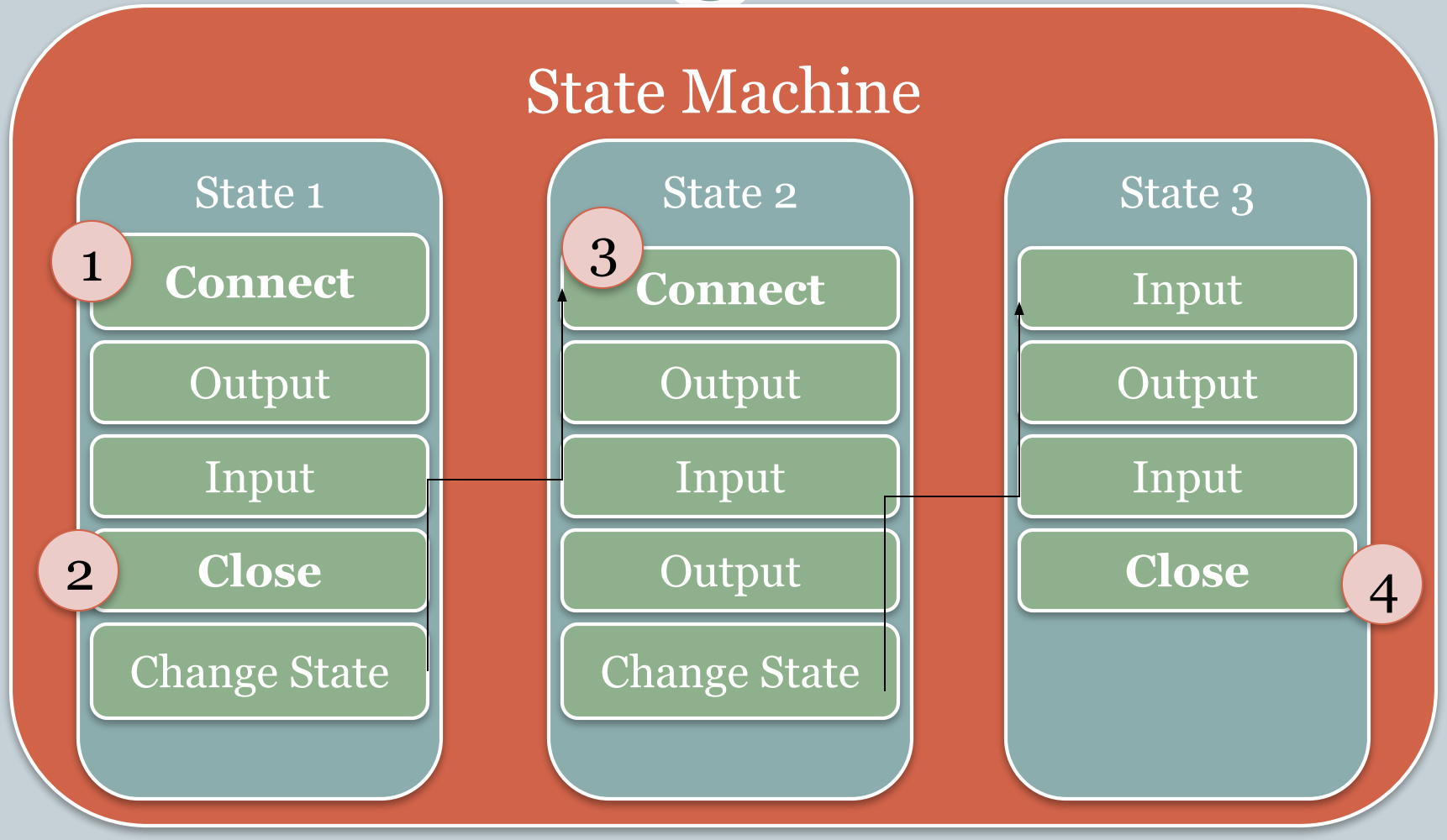
State Modeling: Stream



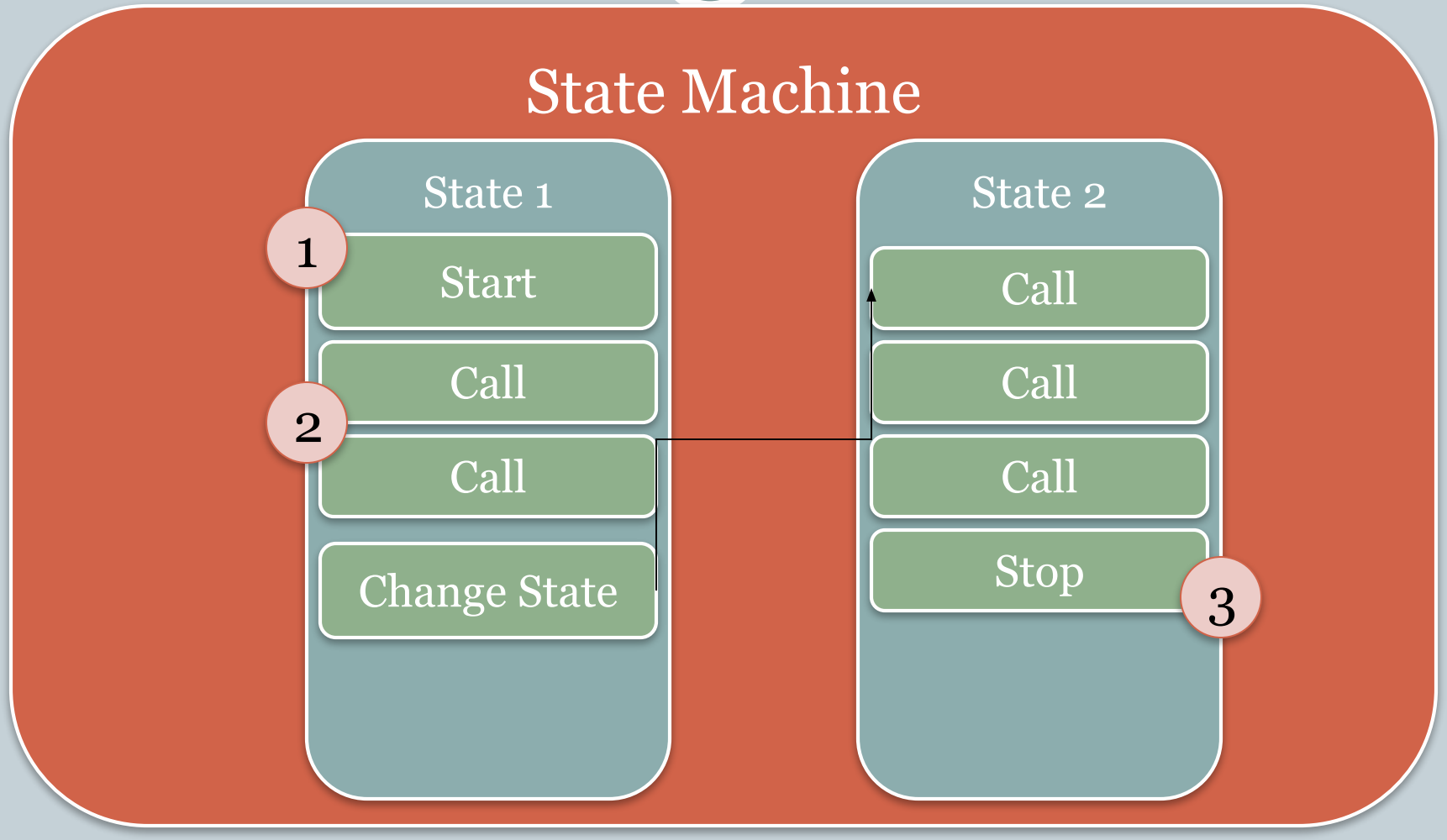
State Modeling: Stream



State Modeling: Stream



State Modeling: Call

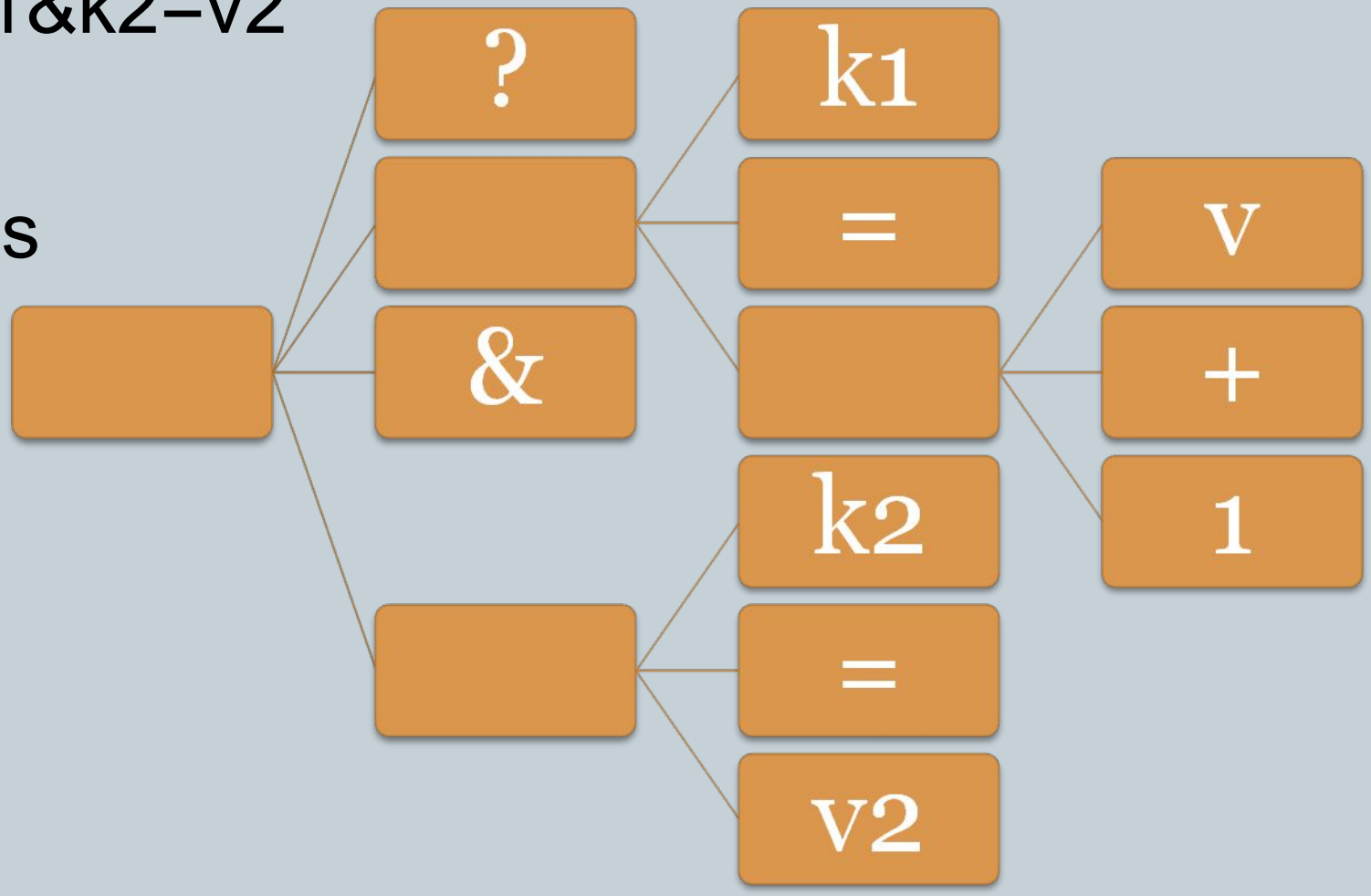


Data Mutations

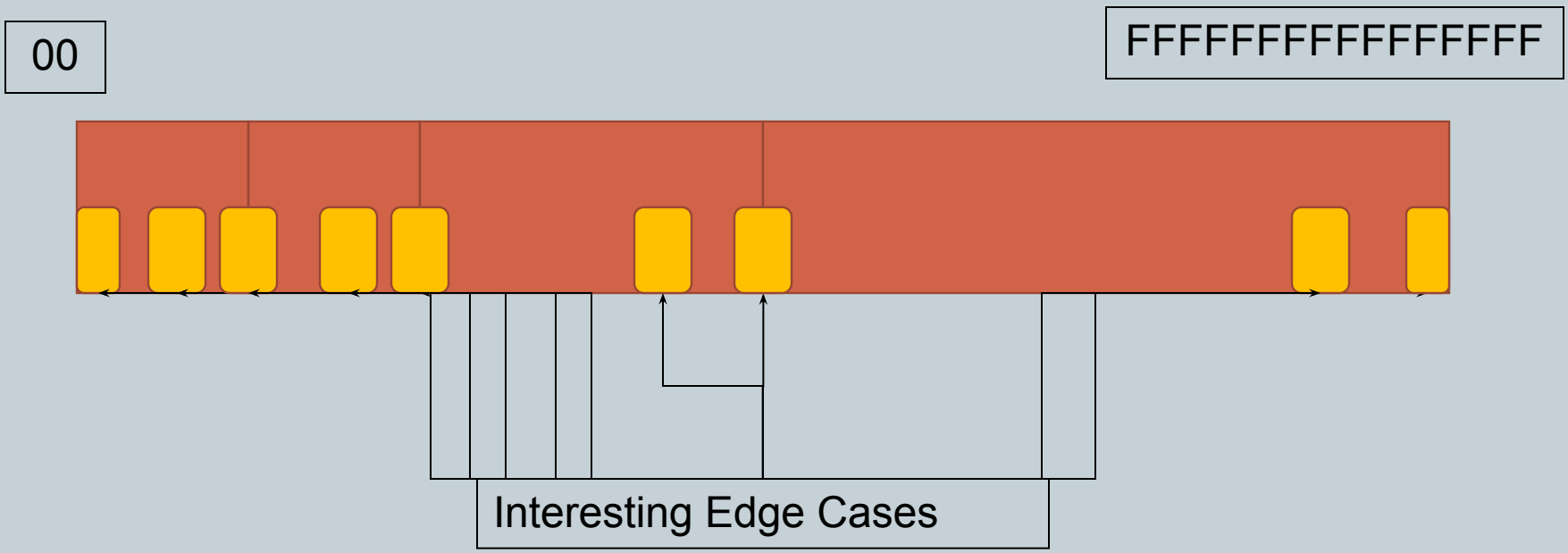
Mutation: String

"?k1=v+1&k2=v2"

40,000+ variations

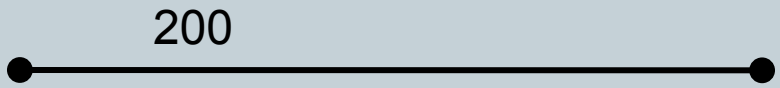


Mutation: Number



Mutation: Size Relation #1

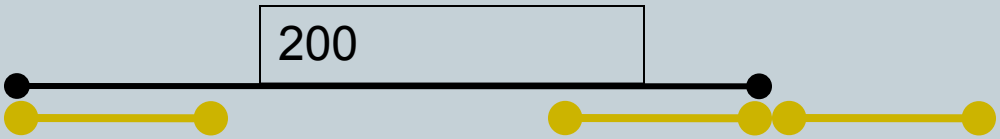
- Length:



- Data:

Mutation: Size Relation #2

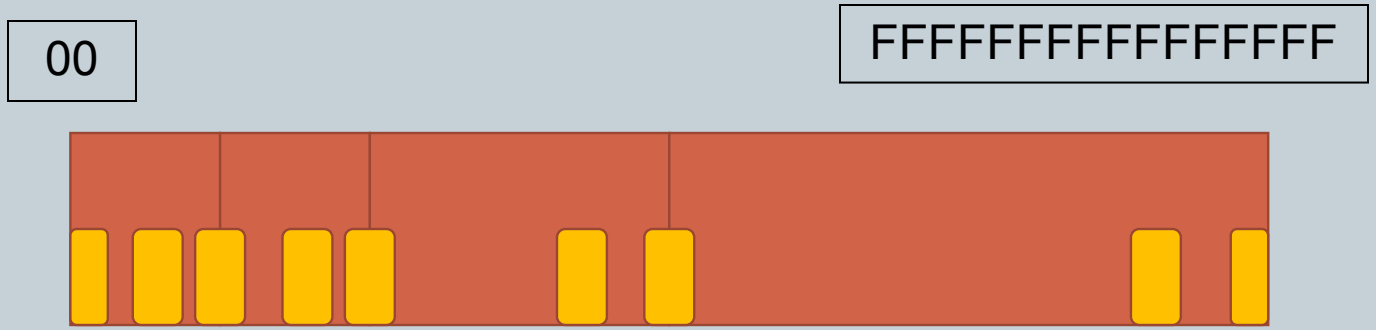
- Length:



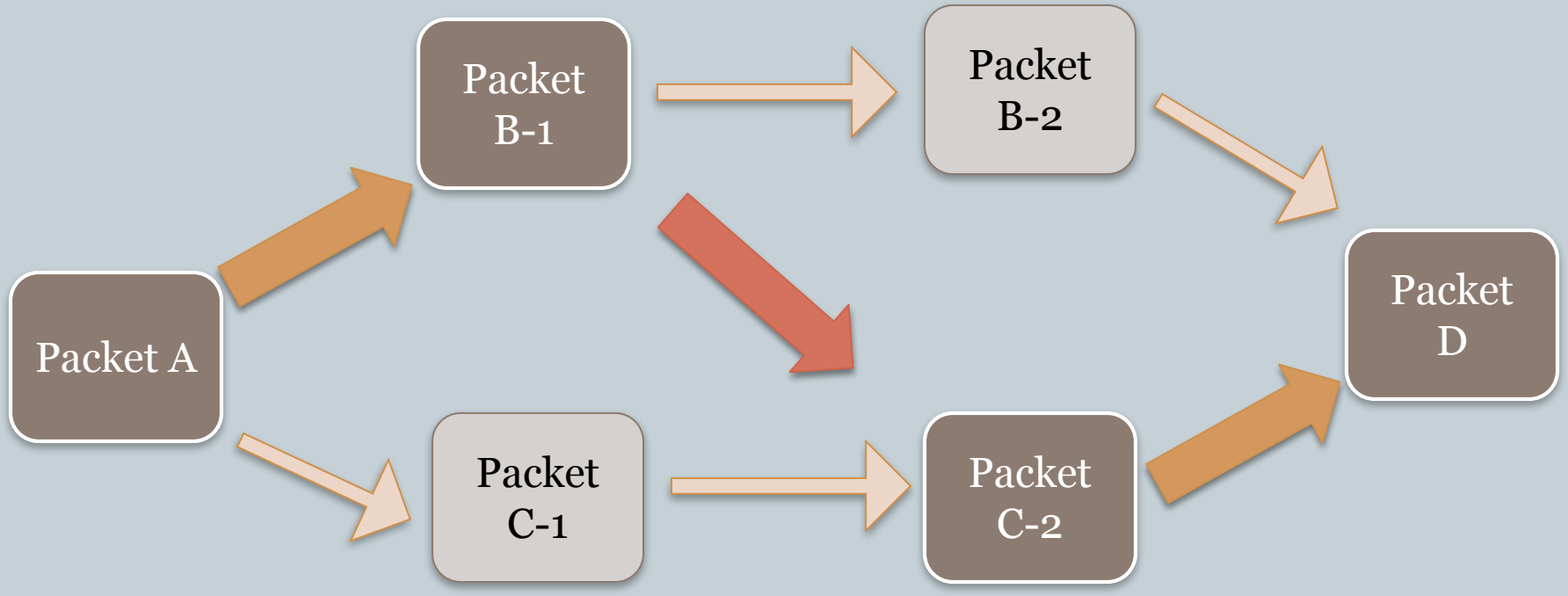
- Data:

Mutation: Size Relation #3

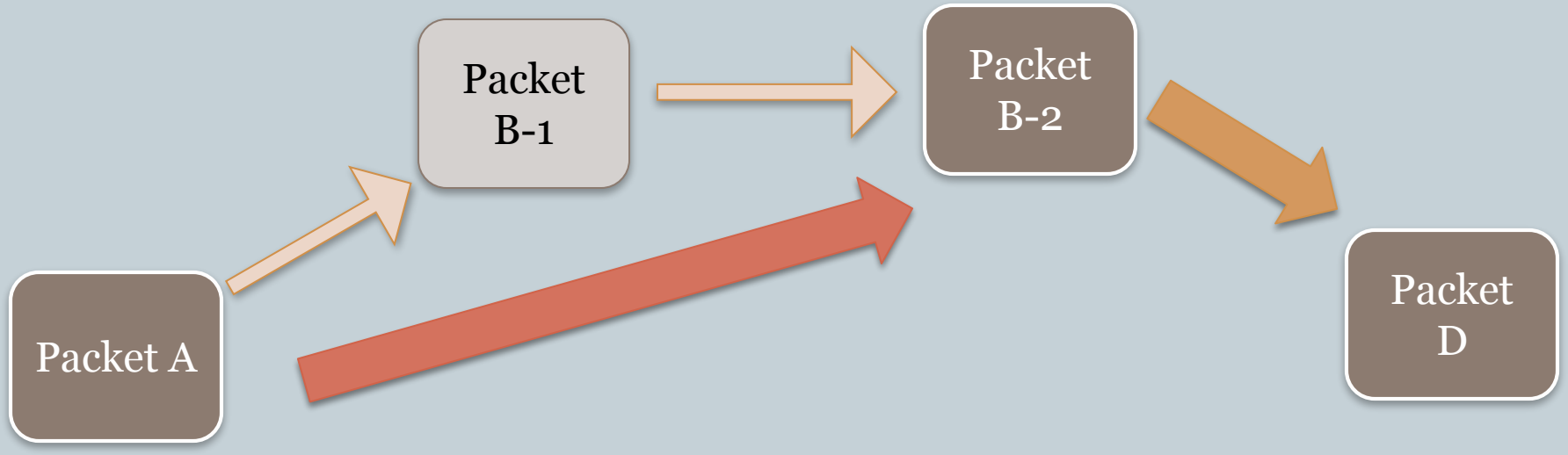
- Data & Length:



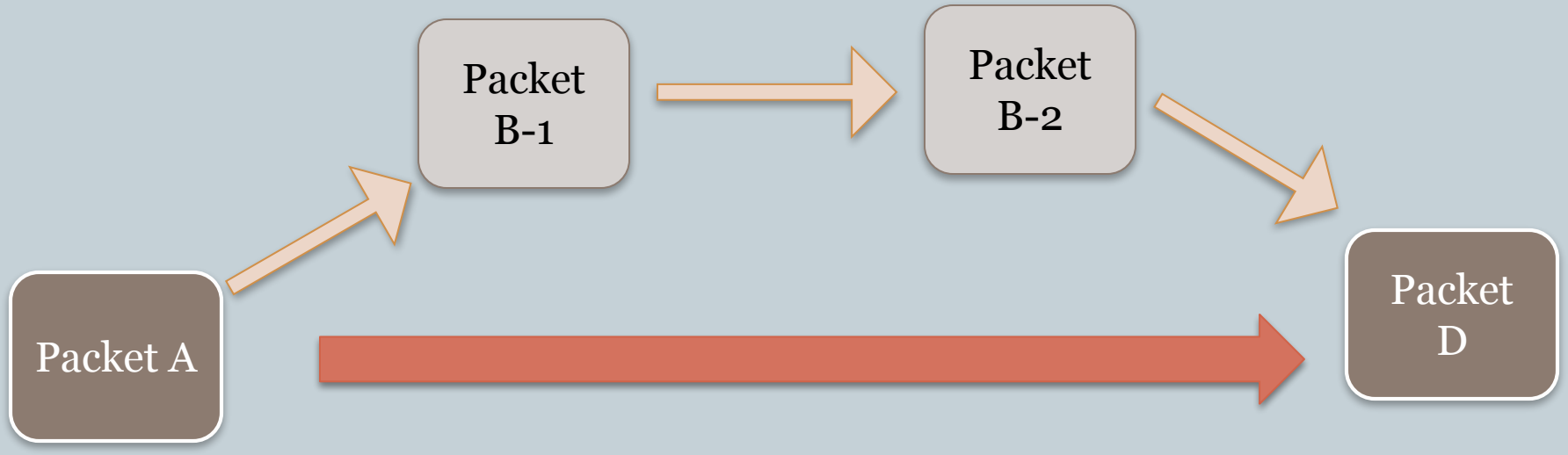
Mutation: State



Mutation: State



Mutation: State



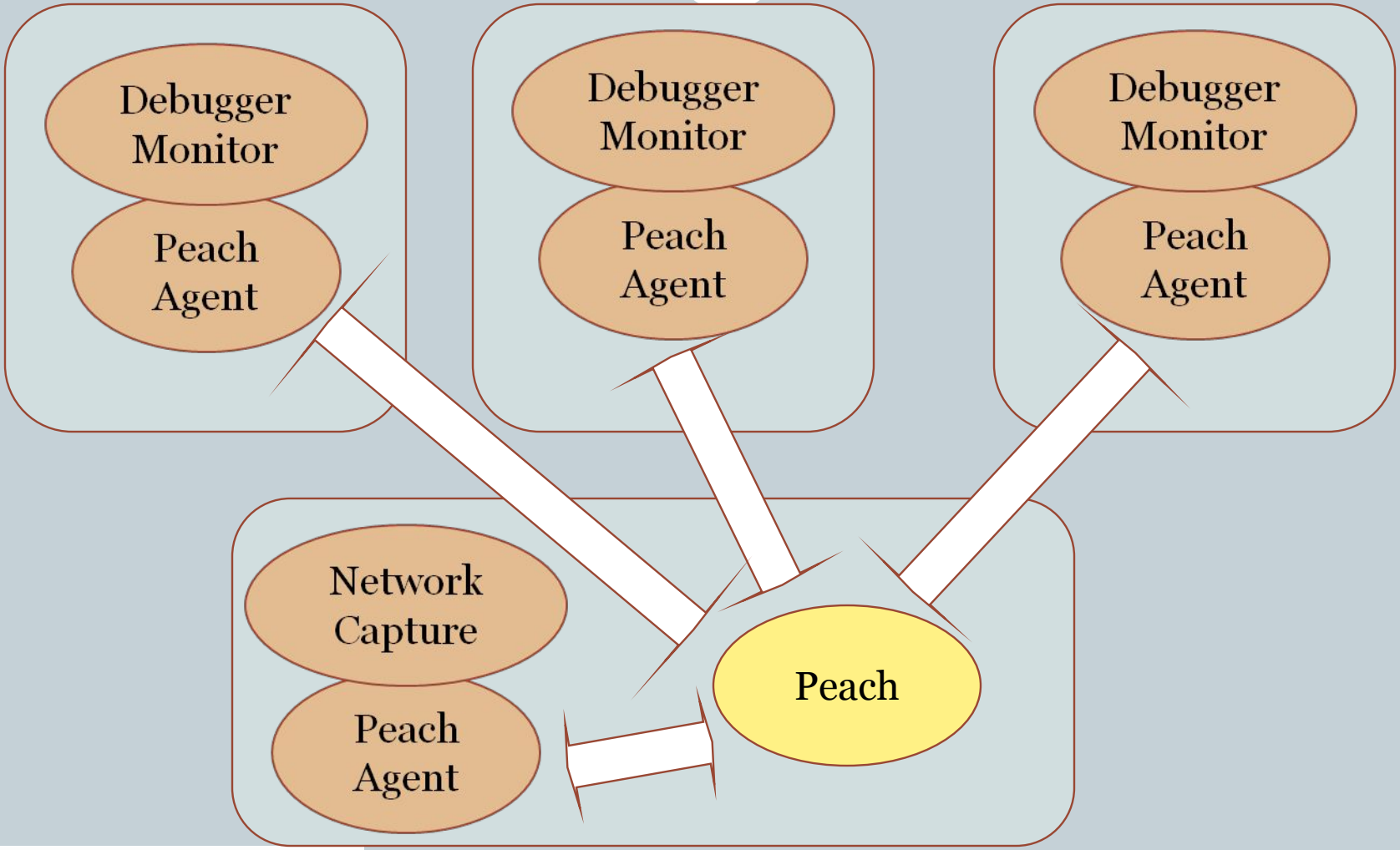
Add Custom Mutators

- Sling some Python
- Add additional mutations
- Specific mutations
- Etc.

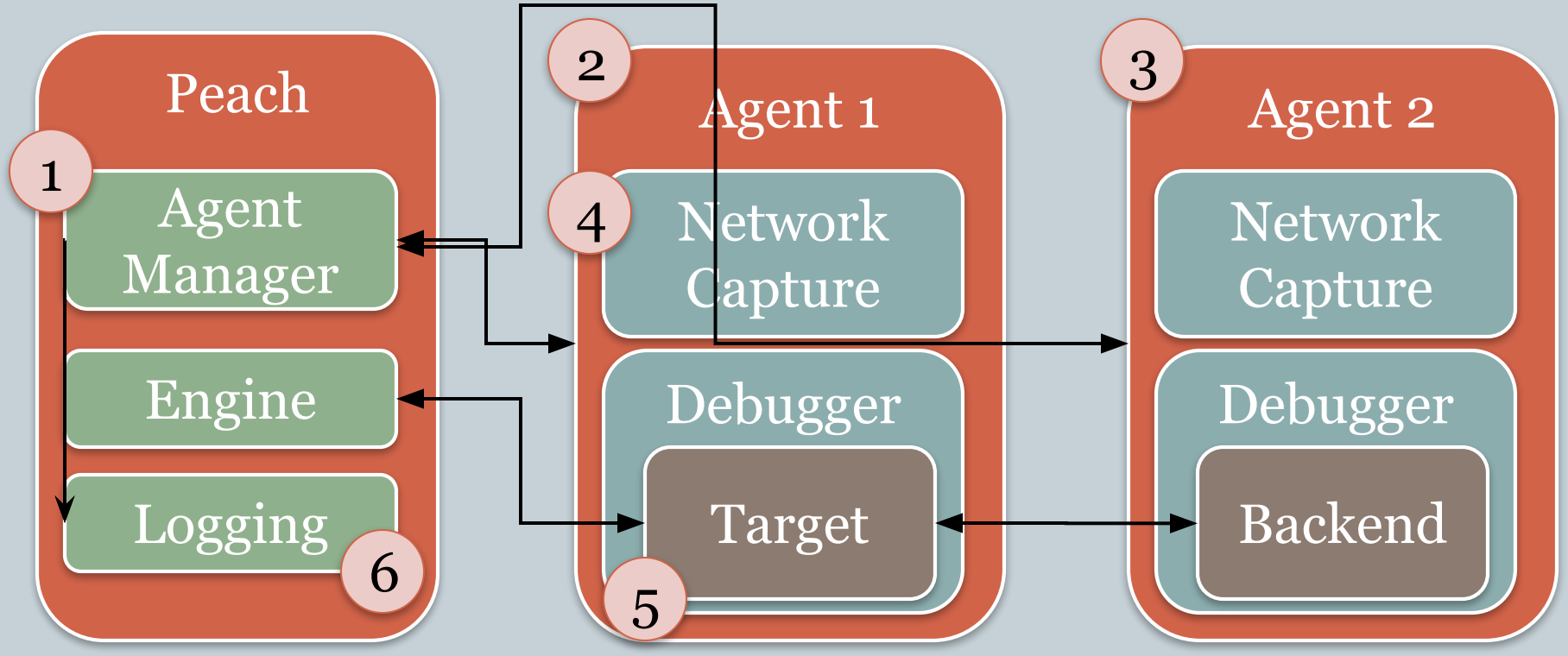
Fault Detection

AND DATA COLLECTION

Agents & Monitors



2 Tier Configuration



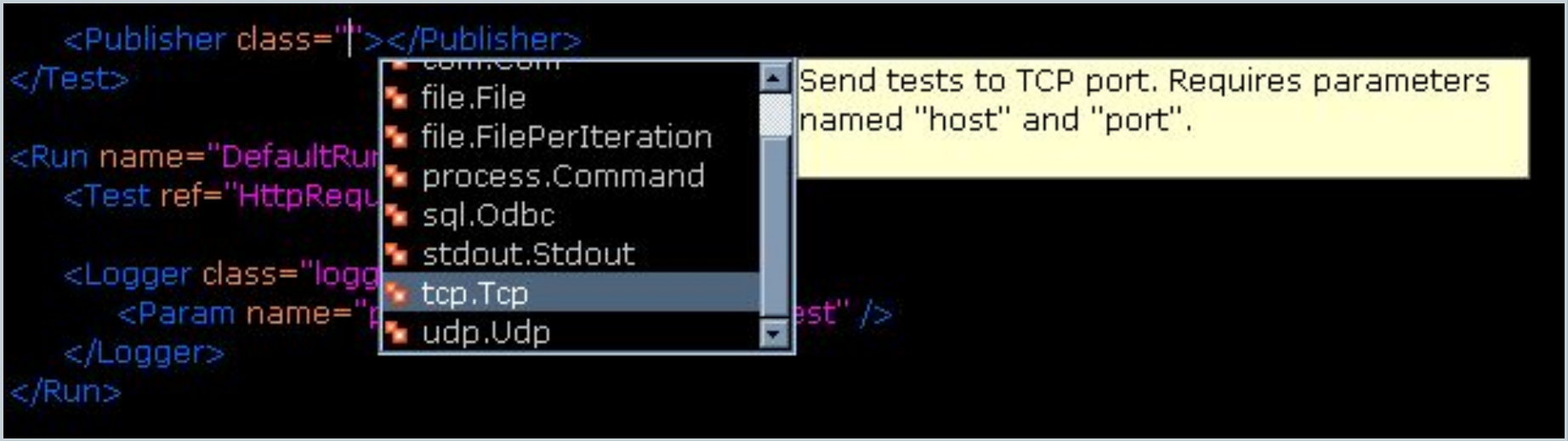
Monitors

- Debuggers
- Process Monitor
- Memory Monitor
- Network Capture
- VM Control (snapshot, revert)
- Networked Power Strips (cycle power)

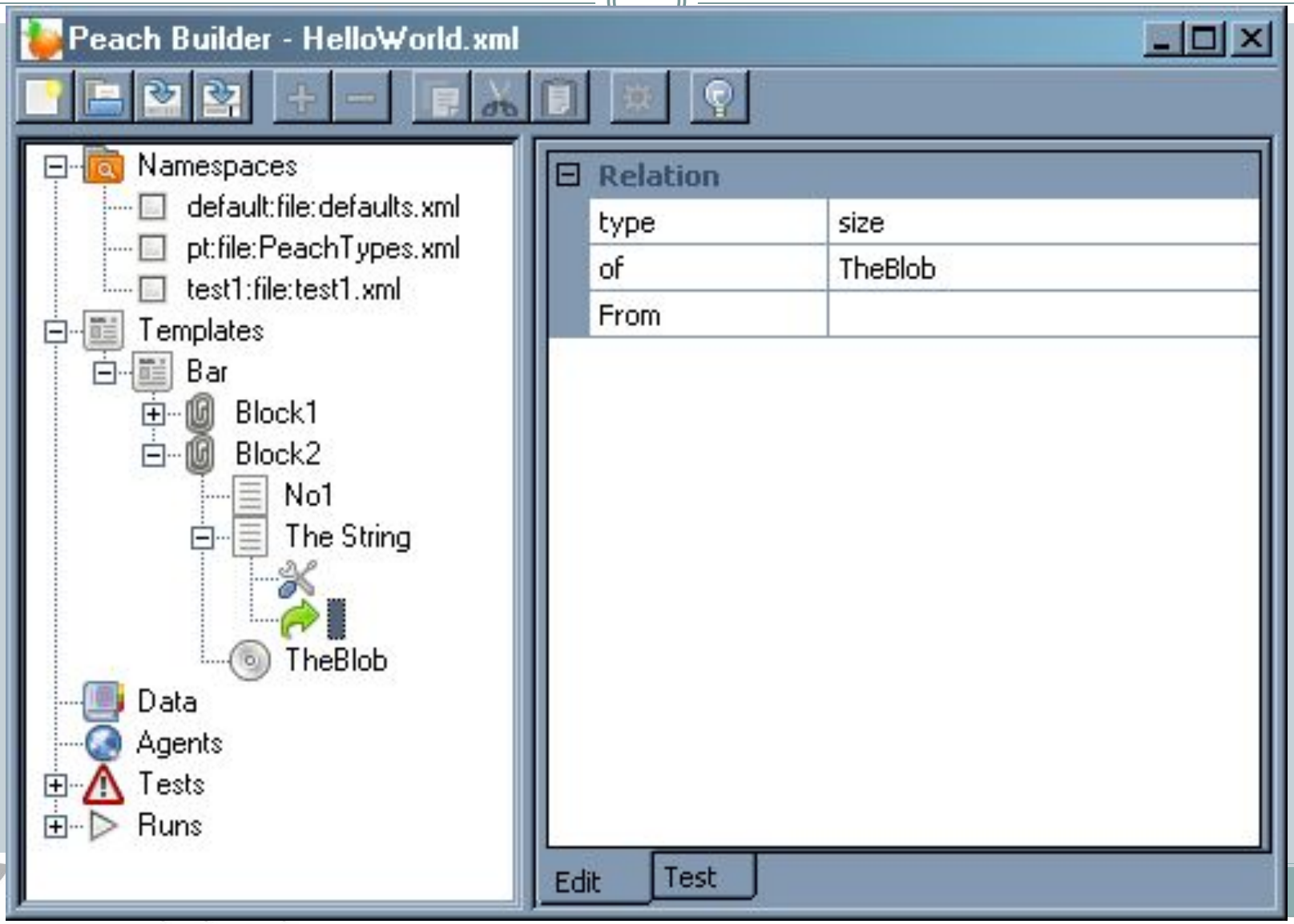
- Easy to implement custom monitors

Peach Development

Documented XML Schema



Peach Builder



Peach Shark

Peach Farm

MASSIVELY PARALLEL FUZZING

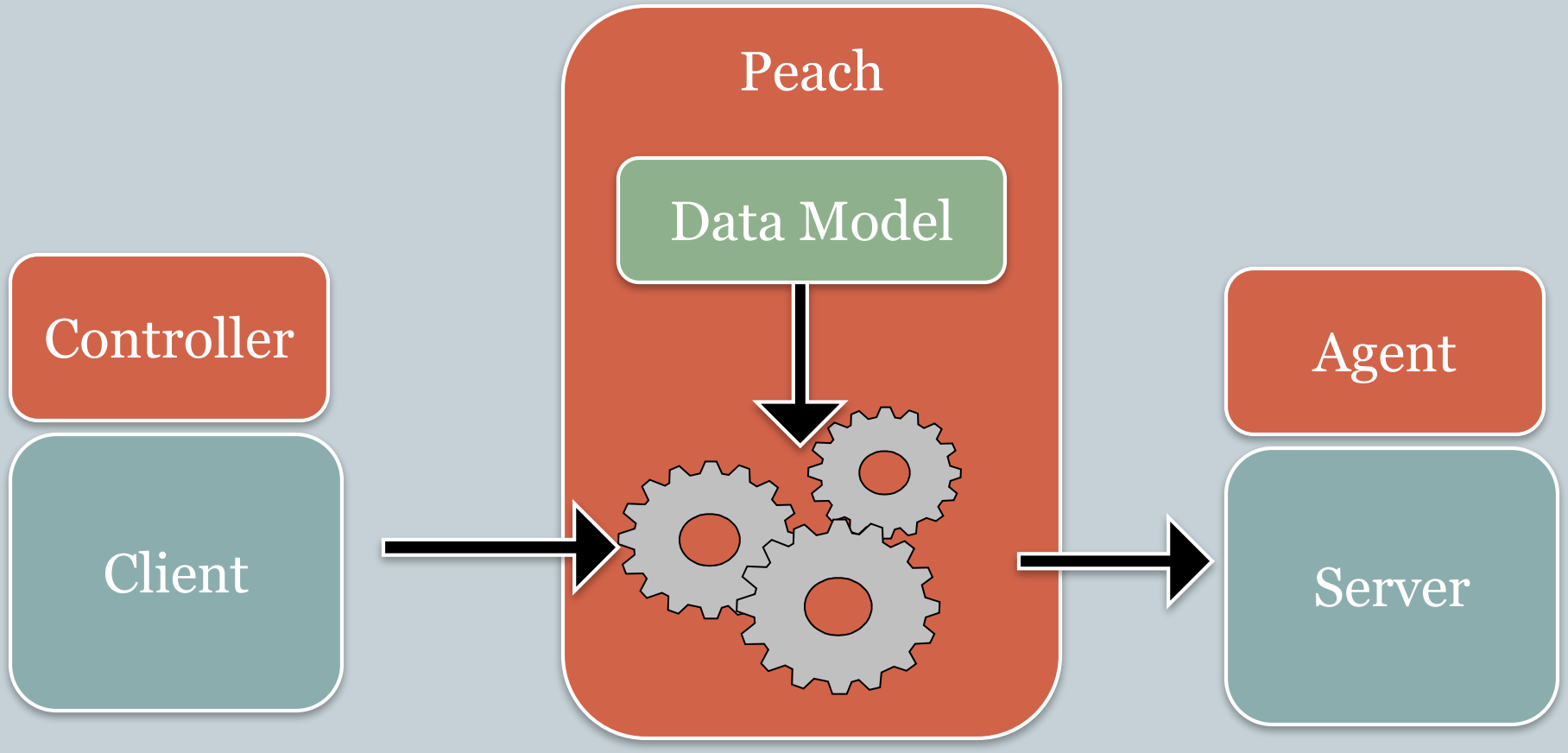
Peach Farm

- Adam Cecchetti
- Massively Parallel Fuzzing
  - Scales from 1 to 10,000 nodes
- Choose your Virtual Platform/Hosting
  - EC2, Xen, VMWare, Etc
- Utilizes Map/Reduce Algorithm
  - Map: Maps the fuzzing cases to indexes and results
  - Reduce: Reduces fuzzing results to interesting cases
- Metric based : Time, size, diff, expected errors, OS faults, crashes

Peach in The Middle

WHAT'S NEXT?

Peach in The Middle



Q & A

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